

# *Welcome to*



*Kempfenfelt Conference Centre  
Barrie, Ontario*

*August 16<sup>th</sup> – 20<sup>th</sup>, 2010  
and beyond...*

*Sponsored by the Ministry of Education, Curriculum and Assessment Policy Branch*



## Goals for GAINS Math CAMPPP 2010

### **Participants leave CAMPPP knowing:**

- ☐ Big Ideas for Number and other relevant Big Ideas that support understanding of Proportional Reasoning
- ☐ there are hundreds of teachers and facilitators in the province working on Big Ideas with whom they could connect
- ☐ they have a role in implementing the many important elements interwoven in co-planning, co-teaching, and co-debriefing

### **Participants practise the following in a safe environment:**

- ☐ use of professional learning protocols
- ☐ creating lesson goals that focus on Big Ideas of Number or other related Big Ideas
- ☐ posing open and parallel questions to evoke and expose thinking in each of the three parts of the lesson
- ☐ planning appropriate, scaffolding questions by anticipating student responses

### **Participants leave CAMPPP believing that:**

- ☐ using open and parallel questions is a powerful approach to teaching because those strategies can:
  - differentiate instruction
  - engage more students
  - expose students' thinking and content knowledge needs
  - build student confidence, independence, mathematical habits of mind
  - focus the teaching, learning and assessment on Big Ideas
  - work in all grades and subjects
  - support pro-active classroom management
  - be implemented relatively quickly by all teachers
- ☐ you need to adjust whatever resource you are using to personalize it to your ways of thinking/being and to your class profile
- ☐ many existing resources could be used as a starting point to develop open and parallel questions
- ☐ the best teachers in the province engage in collaborative professional learning and coaching; they aren't necessarily self-taught
- ☐ all students can learn mathematics, given enough time and support
- ☐ when planning instruction, you have to think about both the math and the students you are teaching
- ☐ working with one or more colleagues is a valuable way to practise planning, teaching, and reflecting
- ☐ there is no one "best" way to do anything



## Big Ideas for Number

- BIN1** A number tells how many or how much.  
*Usually we use numbers to give us the sense of the size of something.*
- BIN2** Classifying numbers or numerical relationships provides information about the characteristics of the numbers or the relationship.  
*Sometimes if you know a little about a number or relationship, you know more than you realized.*
- BIN3** There are many equivalent representations for a number or numerical relationship. Each representation may emphasize something different about that number or relationship.  
*There is usually more than one way to show a number or relationship and each of those ways might make something more obvious about that number or relationship.*
- BIN4** Numbers are compared in many ways. Sometimes they are compared to each other; other times, they are compared to benchmark numbers.  
*Numbers can be compared in different ways - sometimes to each other and sometimes to benchmark numbers.*
- BIN5** The operations of addition, subtraction, multiplication and division each hold the same fundamental meaning no matter the domain to which they are applied.  
*The meanings of addition, subtraction, multiplication and division hold true, regardless of the type of number being used.*
- BIN6** There are many algorithms for performing a given operation.  
*You can add, subtract, multiply or divide in more than one way.*

## Other Relevant Big Ideas

- BIA 2** Comparing mathematical relationships helps us see that there are classes of relationships with common characteristics and helps us describe each member of the class.  
*Groups of functions or relationships go together because they behave in similar ways. Knowing about the group helps us know a bit about each member of the group.*
- BIM 2** Knowing the measurements of one shape can sometimes provide information about measurements of another shape.  
*Sometimes two shapes are related, so knowing dimensions of one shape allows you to figure out dimensions of the other.*

***Big Ideas proposed by Dr. Marian Small***



## Schedule of Events

### Monday August 16<sup>th</sup>

12:00pm – 1:00 pm	Lunch
1:00pm – 1:30pm	Welcome
1:30 pm - 2:45 pm	Plenary: Introduction to Big Ideas
2:45 pm – 3:00 pm	Break
3:00 pm – 4:00 pm	Plenary: Introduction to Big Ideas
4:00 pm – 6:00 pm	Networking Time
6:00 pm – 7:00 pm	Dinner
7:00pm – 8:30 pm	Focused Breakout Session

### Tuesday August 17<sup>th</sup>

7:30 am – 8:30am	Breakfast
8:30 am – 10:30 am	Plenary: Goal Setting with Big Ideas and Consolidation Questions, Assessment for Learning
10:30 am – 10:45 am	Break
10:45 am – 12:00pm	Focused Breakout Session
12:00 pm – 1:00 pm	Lunch
1:00 pm – 2:30 pm	Focused Breakout Session
2:30 pm – 2:45 pm	Break
2:45 pm – 4:45 pm	Plenary: Assessment of Learning, Good Questioning in MATCH
4:45 pm – 6:00 pm	Networking Time
6:00 pm – 7:00 pm	Dinner
7:00 pm – 8:30pm	Focused Breakout Session

### Wednesday August 18<sup>th</sup>

7:30 am – 8:30am	Breakfast
8:30 am – 10:30 am	Plenary: Parallel Tasks, Scaffolding Questions
10:30 am – 10:45 am	Break
10:45 am – 12:00pm	Focused Breakout Session
12:00 pm – 1:00 pm	Lunch
1:00 pm – 3:00 pm	Focused Breakout Session
3:00 pm – 3:15 pm	Break
3:15 pm – 4:45 pm	Focused Breakout Session
4:45 pm – 6:00 pm	Networking Time
6:00 pm – 7:00 pm	Dinner



## Schedule of Events

### Thursday August 19<sup>th</sup>

7:30 am – 8:30am	Breakfast
8:30 am – 10:30 am	Plenary: Open Questions, Scaffolding Questions
10:30 am – 10:45 am	Break
10:45 am – 12:00pm	Focused Breakout Session
12:00 pm – 1:00 pm	Lunch
1:00 pm – 3:00 pm	Focused Breakout Session
3:00 pm – 3:15 pm	Break
3:15 pm – 4:45 pm	Focused Breakout Session
4:45 pm – 6:00 pm	Networking Time
6:00 pm – 7:00 pm	Dinner

### Friday August 20<sup>th</sup>

7:30 am – 8:30am	Breakfast
8:30 am – 9:30 am	Focused Cross-Breakout Session
9:30 am – 9:45 am	Break
9:45 am – 12:00 pm	Plenary: Consolidation and Next Steps
12:00pm	Lunch (Brown Bagged)



## TIPS 2.0 Lesson or Session Planning Template

Unit #: Day #: (Title)

Grade

<p><b>Time Bar:</b></p> <p>Indicate the timing for each section.</p>	<p><b>Math Learning Goals</b></p> <ul style="list-style-type: none"> <li>• Two or three math learning goals for this lesson.</li> <li>•</li> </ul> <p><b>Underpinning Big Idea(s)</b></p> <ul style="list-style-type: none"> <li>•</li> </ul>	<p><b>Materials</b></p> <ul style="list-style-type: none"> <li>• list materials required</li> </ul>
<p><b>Minds On...</b></p>	<p><b>Identify Grouping → Strategy</b></p> <p>Get students mentally engaged in the first minutes of the class and establish a positive classroom climate, making every minute of the math class count for every student.</p> <div> <div> <p>Connect to careers</p> <p>Connect to other strands</p> <p>Connect to previous lesson</p> <p>Connect to student interest</p> <p>Orient students to an activity</p> <p>Orient students to materials</p> </div> <div> <p>Develop interpersonal skills</p> <p>Develop learning skills</p> <p>Introduce a problem</p> <p>Do a motivating activity</p> <p>Pose a question</p> <p>Reflect on prior learning</p> <p>Connect to previous group of lessons</p> </div> </div>	<p>Plan links between assessment and instruction:</p> <ol style="list-style-type: none"> <li>1) Identify what will be assessed (curriculum expectations or learning skills).</li> <li>2) Choose an appropriate assessment strategy.</li> <li>3) Choose an appropriate assessment scoring tool.</li> </ol>
<p><b>Action!</b></p>	<p><b>Identify Grouping → Strategy</b></p> <p><b>Students</b> do mathematics: fearless talking and listening, reflecting, discussing, observing, investigating, representing, reasoning, selecting tools and computational strategies, developing understanding, valuing mathematics, constructing concepts, demonstrating concepts, applying concepts, discovering relationships, exploring, hypothesizing, building algorithmic skills, etc.</p> <p><b>Teachers</b> plan appropriate student groupings and strategies, pose questions to expose thinking, listen carefully, observe, offer prompts when necessary, respond to provide appropriate scaffolding and challenge, etc.</p> <p><b>NOTE: Icons in sidebar ( e.g.  ) can be copied into your TIPS 2.0 template.</b></p>	<p>Explicitly label:</p> <ul style="list-style-type: none"> <li>• <b>A<sub>for</sub>L</b> Assessment <i>for</i> learning (inform future instruction)</li> <li>• <b>A<sub>as</sub>L</b> Assessment <i>as</i> learning (reflection)</li> <li>• <b>A<sub>of</sub>L</b> Assessment <i>of</i> learning (student achievement).</li> </ul>
<p><b>Consolidate Debrief</b></p>	<p><b>Identify Grouping → Strategy</b></p> <p>“Pull out the math,” check for conceptual understanding, and prepare students for the follow-up activity or the next lesson. Often this involves whole class discussion and sharing. Students listen to and contribute to reflections on alternate approaches, different solutions, extensions, and connections.</p> <p><b>Note:</b> Students should be well prepared to do mathematics individually after the three-part lesson.</p>	<p> Explicitly identify planned differentiation of content, process, or product based on readiness, interest, or learning preference in order to work in zone of proximal development; save time; give students choice, Provide hyperlinks to:</p> <ul style="list-style-type: none"> <li>• Rationale/research </li> <li>• Video </li> <li>• Lesson artefacts </li> <li>• Professional dialogue </li> </ul>
<p>&lt;Choose relevant label(s)&gt;</p> <p>Application</p> <p>Concept</p> <p>Practice</p> <p>Differentiated</p> <p>Exploration</p> <p>Reflection</p> <p>Skill Drill</p>	<p><b>Home Activity or Further Classroom Consolidation</b></p> <p>Provide meaningful and appropriate follow-up. Choose activities that consolidate understanding, build confidence in doing mathematics independently, help parents see the types of math activities students engage in during class and see connections between the mathematics being taught and life beyond the classroom. Give students some choice through differentiated activities.</p>	<p>Your plan should include activities that are:</p> <ul style="list-style-type: none"> <li>• visual</li> <li>• kinesthetic</li> <li>• auditory</li> </ul>



## Posing Powerful Questions

Lesson Title	Grade/Program
<b>Goals(s) for a Specific Lesson</b> <i>Use the stem "Students will:"</i>	
<b>Curriculum Expectations</b> <i>Highlight parts to be addressed in the lesson (may not be all parts)</i>	
<b>Big Idea(s) Addressed by the Expectations</b>	
<b>Minds On... Sample Question(s)</b> <i>Indicate in brackets the type (open, parallel, other).</i>	
<b>Action! Sample Question(s)</b> <i>Indicate in brackets the type (open, parallel, other).</i>	
<b>Scaffolding Questions</b> <i>(posed to individuals as needed)</i>	
<b>Consolidate/Debrief Sample Question(s)</b> <i>Indicate in brackets the type (open or other)</i>	





## Plenary Session

### Making the Big Ideas Relevant to Proportional Reasoning Meaningful to All of Our Students

These sessions will introduce all participants to the value of developing a solid understanding of proportional reasoning throughout the grades by focusing on the Big Ideas relevant to proportional reasoning.

The sessions will provide opportunities for participants to:

- explore how using the Big Ideas can make lesson goals and classroom questions more precise and more meaningful
- practice the use of and development of open questions and parallel tasks to support differentiated instruction in proportional reasoning and allow success for a much broader range of students
- consider what a rich and inclusive mathematical environment looks like



**Dr. Marian Small**

*Marian Small* is the former Dean of Education at the University of New Brunswick. She has been a teacher and professor of mathematics and mathematics education and is a regular speaker on K-12 mathematics throughout Canada and the US. She has been an author on seven text series at both elementary and secondary levels as well as eight books for the NCTM Navigation Series, *Making Math Meaningful to Canadian Students: K-8*, *Big Ideas from Dr. Small: Grades 4-8*, *Grades K-3*, and *Grades 9 - 12* published by Nelson Education Ltd., and *Good Questions: A Great Way to Differentiate Math Instruction K-8* and *More Good Questions: A Great Way to Differentiate Secondary Math Instruction* (for Grades 6 - 12), jointly published by Teachers College Press, NCTM and Nelson Canada. She is also the author and principal investigator of the PRIME professional learning program.





## Focused Breakout Sessions

### K-2: How Does What WE do Help What THEY Do? Laying the Foundation for Proportional Reasoning

Proportional reasoning involves multiplicative thinking – but students in early primary don't do multiplication! So how does what we do help what they do later? Participants in this session will explore the underpinnings of early number sense as it contributes to the development of proportional reasoning. Following the lead of the plenary sessions, we will build on the use of big ideas to make lesson goals and questioning more precise and meaningful. We will use and develop open and parallel questions, look at student work to coordinate the discussion in math talk communities around big ideas, and build a deeper understanding of the ways we can use classroom conversations as assessment-for-learning to inform our instructional decisions.



*Chris Lynd*

*Chris Lynd* is a retired program consultant for the Trillium Lakelands DSB. A former teacher of Kindergarten to Grade 3, she was instrumental as a board facilitator for the Early Math Strategy. She is presently a consultant for School's Cool Inc., a provider of Early Years programming.



*Glynnis Fleming*

*Glynnis Fleming* is seconded to the Capacity Building Team of the Literacy and Numeracy Secretariat. Having spent most of the last seven years as a K to 8 Mathematics Resource Teacher with the DSB of Niagara, Glynnis has studied mathematics teaching and learning in collaborative groups by co-planning and co-teaching lessons with classes of students from K to 6. It is work in actual classrooms and conversations with teachers about instructional decisions in math that has allowed her to do her greatest learning.



*Gina Micomonaco*

*Gina Micomonaco* is currently a Program Resource Teacher, and was the former Math, Science and Technology Elementary Program Consultant in the York Catholic DSB. In 2008, Gina co-chaired the OAME 2008 conference in York Region. Her past experience includes teaching pre-service education at York University and additional qualifications courses at the University of Toronto. Gina has facilitated many mathematics workshops at both local and provincial levels.



## Focused Breakout Sessions

**3-6: Proportional Reasoning – Rising from the Frames of Counting, Quantity Relationships and Operational Sense**

Welcome CAMPPers! We hope you are packed for a hike through the foothills and valleys of proportional reasoning with your new grade 3 to 6 bunkmates! This week, we will go deeper into the forest of big ideas, following the path mapped out at the lodge by Marian in our plenary sessions. There will be lots of time for cabin chatter about such things as assessment of, for and as learning in our math talk community. Many collaborative teaching and learning strategies will be embedded in our campfire chats. Together we will identify common student misconceptions, create and share open problems and parallel tasks, and design questions to evoke learning.

*Cathy Chaput*

*Cathy Chaput* is a grade 4-8 Curriculum Coordinator with the Wellington Catholic DSB. Mathematics is a passion, and she has engaged in this through teaching math in 3 panels, working and learning with teachers using LNS and TIPS resources, and leading TLCP's, PLC's, after school book studies, and summer programs. She was a regional and board trainer for the Junior Numeracy series, is a proud and grateful member of OMCA, and has presented at OAME math conferences.

*Mike Davis*

An elementary educator for 25 years, Mike Davis is a mathematics and numeracy consultant for Halton DSB. He is currently the treasurer for the OMCA. Mike has co-authored a number of mathematical resources for teachers. He was also a provincial writer and facilitator for the Junior Lead Teacher training, and has facilitated all three parts of the AQ course for Primary and Junior Mathematics for York University. He has presented workshops around the province including at OAME and OAME Leadership.

*Joyce Tonner*

*Joyce Tonner* is a principal with Thames Valley DSB. Joyce is a former president of OMCA and a director on the board for OAME. She was served as a Student Achievement Officer with the Ministry of Education's LNS, and is a co-author of "The Guides to Effective Instruction" (Jr.), and has facilitated both provincial, regional, and board sessions. Joyce leads the Ontario Principal's Council Math team. Joyce has co-authored Nelson junior, intermediate/secondary textbooks, ONAP, and is currently serving on a national advisory committee for an assessment project.



## Focused Breakout Sessions

### 7&8: Proportional Reasoning – A Focus on Ratio and Fractional Relationships

Participants will have the opportunity to engage in hands-on activities within a Math Talk Learning Community in order to deepen their understanding of the Big Ideas for proportional reasoning. Through backward design, participants will make connections between the Big Ideas, the curriculum expectations, learning goals and assessment for and of learning. Essential concepts of proportional reasoning applicable to intermediate grades will be internalized as participants gain an understanding of differentiated strategies through questioning – parallel and open tasks.



*John Ford*

*John Ford* is a Vice Principal at a 7-12 school in the Kawartha Pine Ridge DSB. Prior to becoming a Vice Principal John served as the district's math consultant for Grades 7-10. In this role he took on a leadership role facilitating professional learning for teachers, and educational research in PRIME, CLIPS and Lesson Study.



*Michelle Lang*

*Michelle Lang* is a teacher with the Waterloo Region DSB with over 20 years of experience teaching and facilitating professional learning in intermediate mathematics. As a Learning Services Consultant for six years, she facilitated a variety of professional learning opportunities for teachers of Grades 7 to 10 mathematics. Her provincial leadership roles include provincial math coaching and writing for the recent Math GAINS WINS project.



*Debbie Wines*

*Debbie Wines* is an Instructional Coach in both Literacy and Numeracy working with Grades 7-9 teachers in the Trillium Lakelands DSB. She has been an educator for 19 years, working primarily in Transition Years' classrooms. In her role as coach, she has co-facilitated professional learning series in Differentiated Instruction, Literacy and Mathematical Literacy. She has worked on Ministry Writing Teams and co-facilitated Lesson Study in mathematics in her board.





## Focused Breakout Sessions

### 9&10: Proportional Reasoning – A Focus on Proportional Thinking

This session will provide participants with the opportunity to deepen their understanding from the plenary session as it connects to grade 9 and 10 curriculum. Participants will explore and make sense of the big ideas of proportional reasoning through discussion, sharing and the creation of open and parallel questions. In addition, participants will consider the role of effective uses of manipulatives and technology in their practice. The mathematical processes, math talk learning communities and assessment for and as learning will be highlighted as we make connections between the big ideas of proportional reasoning across the strands.



*Paul Alves*

*Paul Alves* is currently the department head of mathematics at Fletcher's Meadow Secondary School in the Peel DSB. Paul has been active on many writing teams as well as provincial initiatives. Paul is currently an OAME board member, president of CHAMP, and a national instructor with Texas Instruments.



*Sonia Ellison*

A mathematics educator for 15 years, *Sonia Ellison* has taught a variety of secondary mathematics courses. She is currently a Curriculum Consultant for the Halton Catholic DSB where her focus is supporting mathematics for grades 1 to 12. Sonia is presently a vice president with OAME.



*Trish Steele*

*Trish Steele* is the K-12 Numeracy Consultant for Simcoe County DSB. Over the past several years Trish has been involved in Ministry projects such as TIPS, CLIPS, and GAINS. Trish is very honoured to be the recipient of the 2010 OAME Leadership Award for Mathematics.



## Focused Breakout Sessions

### 11&12: Proportional Reasoning – Building to More Complex Relationships

Proportional reasoning is not a strand in the Grade 11 and 12 mathematics courses, so why are we here? Participants will explore the Grade 11 and 12 mathematics curriculum through the lens of proportional reasoning to see how the big ideas of proportional reasoning are embedded. Participants will have opportunities to write lesson goals, develop open and parallel tasks, and pose effective questions in each part of a three-part lesson. Throughout the session participants will consider the role of effective uses of manipulatives and technology, mathematical processes, math talk learning communities, and assessment for/as/of learning. In addition, participants will have opportunities to share their thinking, and engage in focused conversations based on principles of coaching.



*Shirley Dalrymple*

*Shirley Dalrymple* is a mathematics department head with York Region DSB, with eighteen years of experience in the classroom and a two-year secondment to the Ministry of Education. Shirley has taken a leadership role in numerous provincial projects including CLIPS, TIPS4RM MDM4U, TIPS4RM, and TIPS development, OAME Leadership, and the steering committee for the Field's Mathematics Education Forum. Shirley served as an OAME board member for many years and is a past president of OAME.



*Liisa Suurtamm*

*Liisa Suurtamm* is Mathematics Consultant 7 – 12 with the DSB of Niagara and is also the coordinator of the secondary Instructional Coaching project in the board. She most recently finished her role as co-chair of the OAME2010 Annual Conference. Liisa has been part of several ministry summer camps working on TIPS4RM, GSP Activities and Grade 12 supports. She has also been involved with EQAO activities including the development of test items and an author with McGraw-Hill.



*Karen Timson*

*Karen Timson* is a secondary mathematics teacher with York Region DSB, with 20 years experience in the classroom and 5 years experience as Intermediate-Senior Mathematics Consultant. Karen participated in the Ministry expert panel for Leading Math Success. She has worked with Pearson Education on the development of resources for Gr. 11 and Gr. 12 College mathematics. For the past three years, Karen has taught the online Honour Specialist Mathematics course for OISE.



## Focused Breakout Sessions

### Leadership: Creating an Environment for Mathematical Success

Math Department Heads, Divisional Teachers, Consultants, Coordinators, and Administrators are critical leaders that affect school and board agendas for change. Over the course of the week, participants will gain an understanding of the *Five Core Leadership Capacities*, and uncover how these critical areas of leadership support and Board and School Improvement Planning. Using NCSM's *Principles and Indicators for Mathematics Education Leaders (PRIME) Leadership Framework*, participants will make connections to their current stage of leadership in mathematics, and identify actions and interactions that will support their growth as a leader as well as the leadership of those with whom they work. By making explicit connections to their Board or School Improvement Plan, participants will identify potential enhancements to current board / school structures, conditions and processes to ensure sustained and meaningful improvement in student achievement.



Connie Quadrini

Connie Quadrini is the Grades 7-12 Mathematics Program Consultant for the York Catholic DSB. Her current work focuses on facilitating PLC's involving Grades 4-9 teachers within families of schools, and supporting administrators in the development and implementation of School Improvement Plans. Connie is president-elect for OAME and was co-chair of the OAME 2008 annual conference. Most recently she has served as a Steering Team Lead for the 2008-09 Coaching for Math GAINS initiative, co-organizer of Math CAMPPP 2008, 2009, 2010, and co-facilitator of the *PRIME Leadership Framework* Adobe Connect Book Study.



Shelley Yearley

Shelley Yearley is a Mathematics Consultant with Trillium Lakelands DSB, and facilitates a variety of professional learning opportunities for teachers and administrators. Shelley has taken a leadership role in numerous provincial projects, including Steering Team Lead of the 2008-09 Coaching for Math GAINS initiative, co-organizer of Math CAMPPP 2008, 2009, 2010, facilitator of the *Building Teachers' Capacity for Success* Adobe Connect Book Study, and lead for LMS and TIPS4RM development.



## Organizers



*Kaye Appleby*

Kaye Appleby serves as a provincial mathematics coach and as project manager for a variety of GAINS initiatives in the province. Her CAMPPP responsibilities include making arrangements for CAMPPP facilities, supporting team leaders, and processing claims for reimbursement of costs. As a retired mathematics educator Kaye has a keen interest in the exciting work underway in Ontario. In her role she is lucky to be able to see the enthusiasm with which many groups work on diverse projects to improve the opportunities available to students across the province.



*Myrna Ingalls*

Myrna Ingalls is an Education Officer in the Curriculum and Learning Resources Unit of the Curriculum and Assessment Policy Branch of the Ministry of Education. Myrna works with mathematics instructional leaders from across Ontario to develop research-affirmed instructional resources and implementation supports, to develop instructional leadership capacity during development and dissemination of these resources, and to research the effectiveness of these supports and approaches. Myrna works strategically with representatives of other branches and divisions of the Ministry of Education to align implementation activities, research, and policy connected to mathematics. She regularly works with executives and members of the Ontario Association for Mathematics Education (OAME) and the Ontario Mathematics Coordinators Association (OMCA), mathematics education researchers, and board-level leaders to ensure that ministry-sponsored activities are responsive to needs. Myrna strives to harness the energies of educators across the province in making math gains in student achievement, in closing gaps, and in increasing public confidence by Growing Accessible Interactive Networked Supports (GAINS).





## Useful Resources



<http://www.edugains.ca/>



<http://www.edugains.ca/newsite/math/tips.htm>



<http://www.edugains.ca/newsite/math/clips.htm>

<http://www.mathclips.ca/>



<http://eworkshop.on.ca/edu/core.cfm>



Webcasts for Educators

<http://www.curriculum.org/secretariat/archive.shtml>



Capacity Building Series

<http://www.edu.gov.on.ca/eng/literacynumeracy/inspire/research/capacityBuilding.html>



O.A.M.E.  
Ontario Association for  
Mathematics Education

<http://www.oame.on.ca>







<http://gains-camppp.wikispaces.com/CAMPPP+2010>



## Glossary – Frayer Model


<p>Definition:</p> <p>The <b>deliberate use of multiplicative relationships</b> to compare quantities and to predict the value of one quantity based on the values of another.</p>	<p>Characteristics:</p>
<p>Proportional Reasoning</p>	
<p>Examples:</p>	<p>Non-examples:</p>

<p>Definition:</p> <p>  :  =  :  </p>	<p>Characteristics:</p>
<p>Proportion</p>	
<p>Examples:</p>	<p>Non-examples:</p>



## Glossary – Frayer Models

<b>Definition:</b>  Two variables are proportional if the values of one are a constant multiple of the corresponding values of the other.	<b>Characteristics:</b>
<div style="border: 2px solid black; border-radius: 50%; width: 150px; height: 50px; margin: 0 auto; display: flex; align-items: center; justify-content: center;">           Proportional         </div>	
<b>Examples:</b>	<b>Non-examples:</b>

<b>Definition:</b>	<b>Characteristics:</b>
<div style="border: 2px solid black; border-radius: 50%; width: 150px; height: 50px; margin: 0 auto; display: flex; align-items: center; justify-content: center;">           Ratio         </div>	
<b>Examples:</b>   2:1 2 hands and feet and arms and legs per 1 person	<b>Non-examples:</b>



## Glossary – Frayer Models

<b>Definition:</b>  A comparison of two values with different units.	<b>Characteristics:</b>
<div style="border: 2px solid black; border-radius: 50%; width: 100px; height: 50px; margin: 0 auto; display: flex; align-items: center; justify-content: center;">           Rate         </div>	
<b>Examples:</b>	<b>Non-examples:</b>

<b>Definition:</b>  A ratio with a second term of 100	<b>Characteristics:</b>
<div style="border: 2px solid black; border-radius: 50%; width: 100px; height: 50px; margin: 0 auto; display: flex; align-items: center; justify-content: center;">           Percent         </div>	
<b>Examples:</b>	<b>Non-examples:</b>



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